Introduction to robotics

By: Kyle Budgell

What is robotics?

Robotics is the branch of technology that deals with the design, construction, operation, and application of robots.

Actuation components in robotics

Stepper motors - basically a digital DC motor that can allow you to select a certain degree of movement

Piezo motors - use a piezoelectric, ceramic element to produce ultrasonic vibrations of an appropriate type in a stator structure.

Air muscles - Soft devices that are used to robots and animatronics. They contract when pressurized with gas air. More simple systems use a small air pump or compressor.

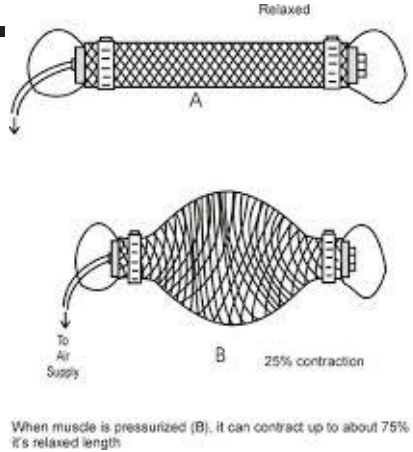
Elastic nanotubes - Basically just like skin, helps the robots feel heat and pressure like humans.

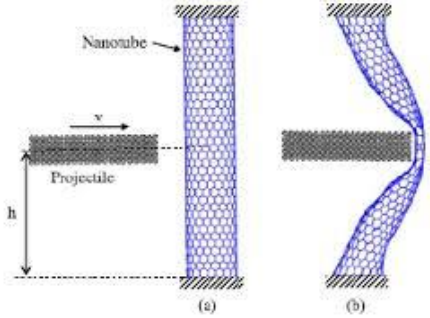
Mechanical grippers - Uses finger like levers to help the robot lift up objects.

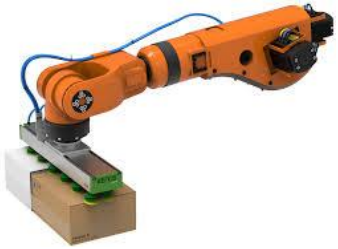
Vacuum grippers - Just like mechanical grippers, but these are ideal for picking up strange and uneven objects like glass or plastic.

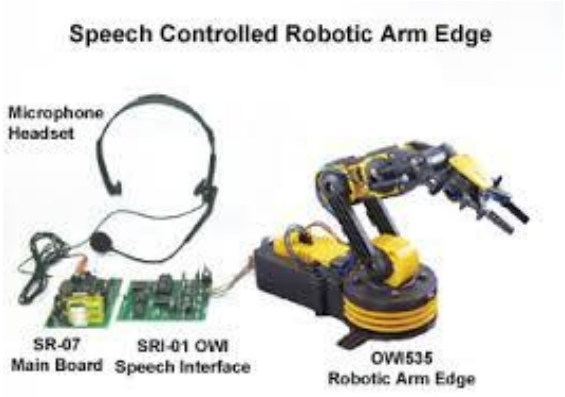
Speech recognition - Helps the robot recognize certain commands that it is given through voice.

Some pictures of components:









How are robots controlled?

There are three main methods.

Tethered - The easiest way, it’s basically just connecting the robot physically to wires.

Wireless - Infrared transmitters and receivers are used to cut the cables connecting the robot to the user.

Autonomous - Using a microcontroller in the robot and programming it to react to input from its sensors. Basically, you’re programming it to give it a mind of its own.

How do humans interact with / control robotics?

Proximate interaction - may take the form of a robot assistant, and may also include a physical interaction with the robot.

Social interaction - includes social, emotive, and cognitive aspects of interaction. In social interaction, the humans and robots interact as peers or companions.

Remote interaction - The robot is controlled with a remote and is separated from the human spatially or even temporarily.

How are dynamics and kinematics a part of robotics?

Well, robotic kinematics are essential for describing an end-effectors position, orientation as well as movement of the joints.

Dynamics is crucial for analyzing and synthesizing the dynamic behavior of a robot.

Where I got my information:

Slide #2 - https://bit.ly/3mnd4if

Slide #3 - https://robotiq.com/products/vacuum-grippers , https://motioncontrolsrobotics.com/grabbing-attention-with-mechanical-grippers/ , https://bit.ly/3isYR0U , https://bit.ly/35yED29 , https://bit.ly/2RnGSNo , https://ieeexplore.ieee.org/document/6230890

Slide #5 - https://www.robotshop.com/community/tutorials/show/basics-how-do-i-control-my-robot

Slide #6 - https://humanrobotinteraction.org/1-introduction/

Slide #7 - https://bit.ly/3mjBMQH